



SESAR Deployment Manager

PBN Workshop - 19 October 2017

John Dow

FAS Implementation Lead

Airspace, ATM & Aerodromes, UK CAA

- **UK Future Airspace Strategy**
- **Regulator perspective**
 - Certification and installation of airborne equipment**
 - Approval of airspace users to operate PBN**
 - Approval of airspace design**

“The UK FAS was established in support of the SESAR 1 European ATM Master Plans. The UK airspace modernisation strategy will remain aligned with the SESAR deployments and linked to the SESAR 2020 roadmap.”

SESAR CONCEPT TO REALITY

- FAS is strongly aligned to the SESAR target concept and draws on the work undertaken initially through the Master Plan edition 2 and continued through the updates of SESAR 1.
- The FAS has looked to utilise the extensive research work carried out in SESAR to inform the modernisation strategy....
- ...Especially the large, cross industry initiatives, with greatest potential to deliver benefits – such as PBN, Queue Management, CDO/CCO and A-CDM.



ICAO Airspace System Block Upgrades

- Blocks of modernisation capabilities tailored by region
- Block 0 Performance improvement Areas:
 - Airport operations
 - Globally Interoperable Systems & Data
 - Optimum Capacity and Flexible Flights
 - Efficient Flight Path

FAS has evolved...

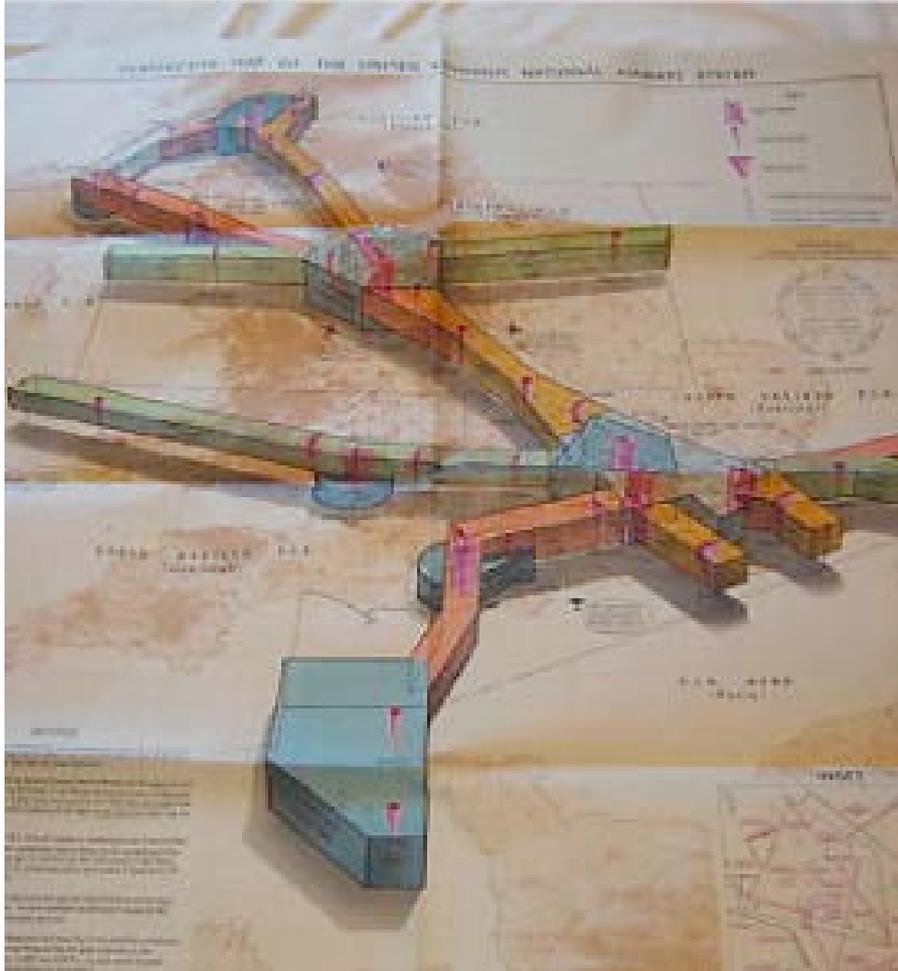
UK Future Airspace Strategy

Strategic Case
for Airspace
Modernisation

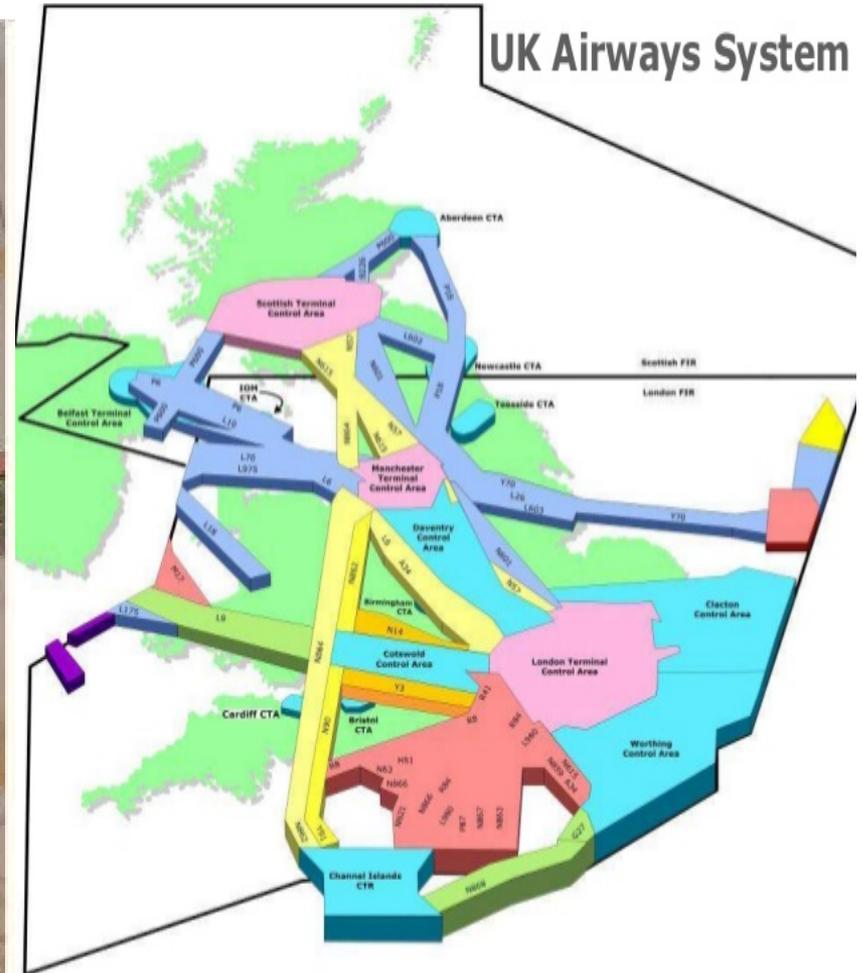
UK Airspace
Modernisation
Strategy

Industry
Deployment
Plans

“The core of the UK airspace structure was developed in the 1950s and has evolved since then....”.



1950's



Current

- **The FAS aims to align industry investment plans behind a common mission; to:**
- **Save passenger time and avoid** delays through the provision of additional airspace capacity when and where it is needed across the air transport network;
- **Cut aviation emissions per flight and save fuel** by enabling greater efficiency;
- **Better manage noise impacts** by reducing the number of aircraft overflying population centres and holding at lower altitudes; and
- **Further enhance aviation safety** by reducing airspace complexity and introducing new technologies that help to manage the residual risks.

Key FAS Upgrades

- **En-route airspace upgrades** to remove the fixed structures, adding capacity and enabling more direct and free routes;
- **Terminal airspace upgrades** to fundamentally redesign the route network taking advantage of advances in technology, especially satellite navigation;
- **Queue management upgrades** to stream traffic through speed controls in the en-route and reduce the reliance on stack holding in terminal airspace;
- **Airspace upgrades at lower altitudes** to redesign airport arrival and departure routes, allowing flights to climb and descend continuously and better manage the impacts of aircraft noise; and
- **Airspace information** upgrades to provide and receive accurate data about traffic flows to better manage ground delays and airspace bottlenecks.

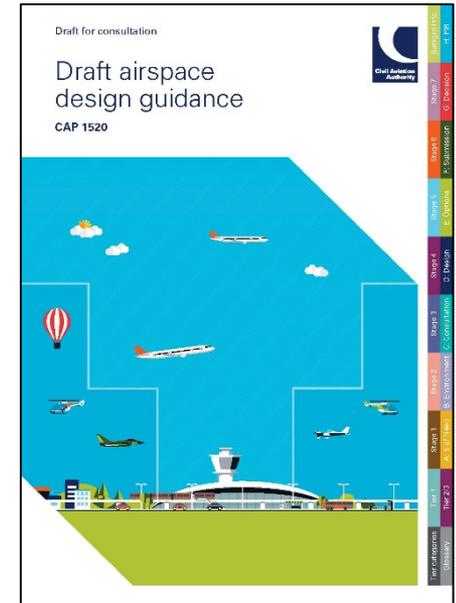
- A Significant enabler in delivering FAS upgrades
- NATS PBN Research Project
 - ❑ Provides a comprehensive data set of aircraft performance in various flight phases:
 - ❑ Covering RNAV 1 and RNP 1 Navigation Specifications
 - ❑ Low level turns and straight leg segments
 - ❑ High level, high speed turns and straight leg segments
 - ❑ Holding pattern and entry procedures
 - ❑ Offset capability (TPO)
- Has led to the development of:
 - CAP 1385 – PBN Enhanced Route Spacing Guidance
 - CAP 1378 – PBN Airspace Design Guidance: Noise mitigation considerations when designing PBN arrival and departure procedures

Key Developments

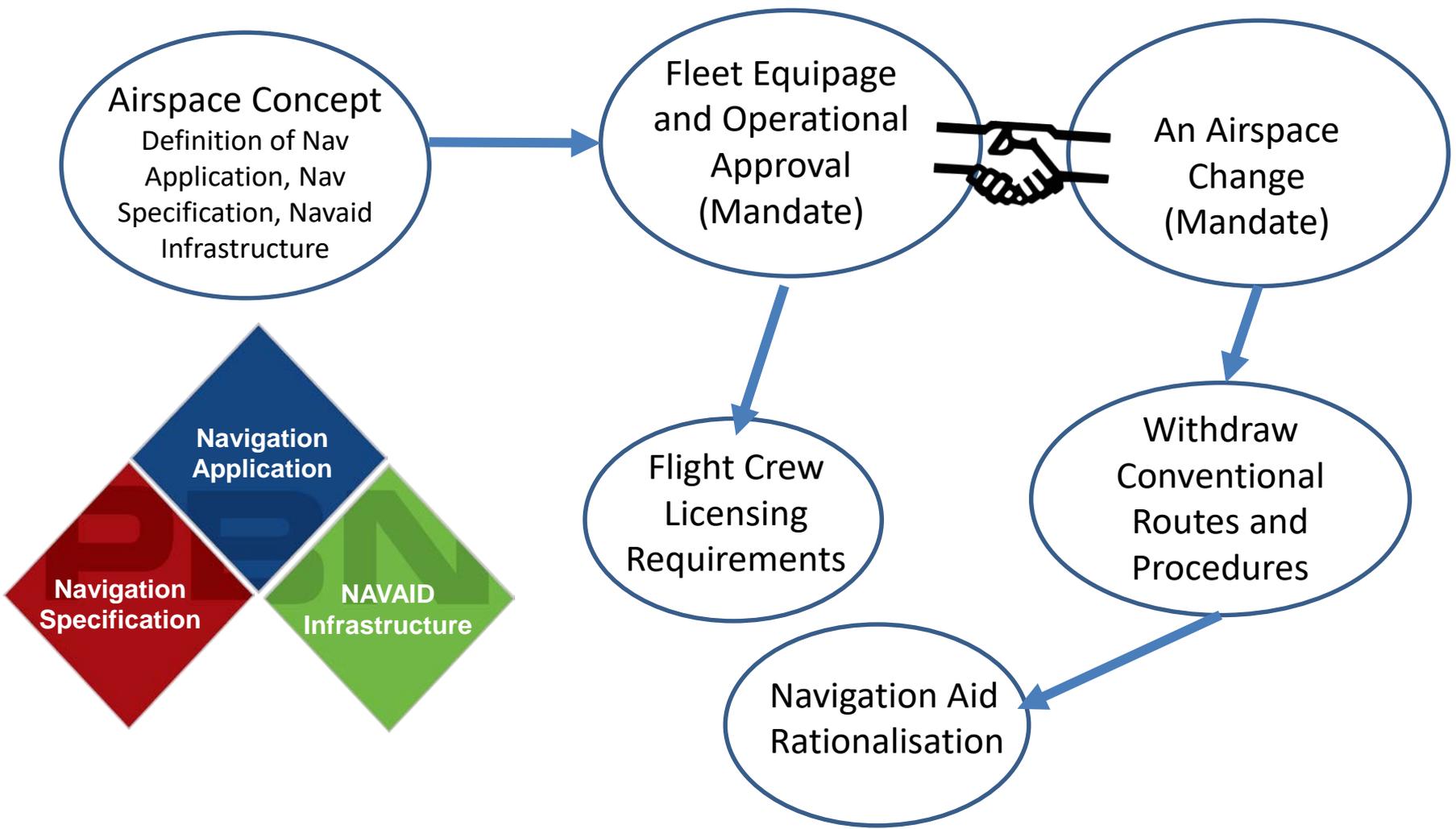
- Network ATM Technology Upgrade
- SESAR Deployment e.g., PCP
- Airspace Developments
 - ❑ RNAV 5 all routes
 - ❑ RNAV 1 SIDs at London Gatwick, Luton, Birmingham, Bristol
 - ❑ RNAV 1 STARs at Bristol, Hurn sector (SAIP)
 - ❑ LAMP 1A (London City Point Merge and RNAV 1 SIDs)
 - ❑ RNP 1 + RF SIDs at London Stansted
 - ❑ RNAV 1 in IoM/Antrim en-route airspace supporting closely spaced parallel routes
 - ❑ FASI North, including Scottish TMA and Northern Airports (Manchester etc.)
 - ❑ FASI South, including Heathrow R3 and a complete South East airspace re-design
 - ❑ Fuel and CO₂ savings through SID truncation
- Airport 3D approaches (LNAV/VNAV and LPV)
- GBAS feasibility and options studies
- Navaid (VOR/NDB) Rationalisation & (DME) Optimisation

Against a backdrop of:

- Institutional/economic uncertainty
- Major local environmental opposition and Judicial Reviews
- UK Government consultation on:
 - ❑ UK Airspace Policy – A Framework for Balanced Decisions on the Design and Use of Airspace
 - ❑ Air Navigation Guidance on Airspace and Noise Management and Environmental Objectives
- Revised Airspace Change Process (CAP 1520)
- Adoption and planning for multiple new EU / EASA Regulations at the same time:
 - ❑ SERA / PCP
 - ❑ Part-ASD / Part-ATS / Part-AUR (PBN-IR)
 - ❑ Part-FCL
- Lack of a holistic regulatory programme (independent development and timing of regulations)



The (*ideal*) Route to Airspace Modernisation with PBN



Certification and installation of airborne equipment

- **Lack of key European regulatory guidance**
 - ❑ Still using JAA TGL No. 10 Rev 1, awaiting publication of EASA CS-ACNS
 - ❑ Relying on FAA criteria for RNP 1 (AC90-105A)
- **No mandate on Operators**
 - ❑ Retrofit driven by airport development
 - ❑ Airport development dependent on fleet renewal
 - ❑ No incentive for early movers
- **Business case difficult to make for some regional aircraft types**
 - ❑ Costly modifications (worth more than the airframe)
 - ❑ Available avionic solutions
 - ❑ Timescales to retrofit

Approval of airspace users to operate PBN

- **Flight operations requirements**
 - ❑ Update to Air-OPS (Commission Regulation (EU) No. 2016/1199) and removal of non-complex PBN from Part-SPA has made approvals simpler, but led to ramifications with respect to ramp inspections (SAFA and SACA) i.e., no Ops Spec record
- **Flight Crew Training & Certification**
 - ❑ New Licensing requirements (Commission Regulation (EU) No. 2016/539) introduced without all of the fleets being equipped or airspace structure (APV approaches) available to support pilot training and testing
- **Confusion regarding the differences between Generic-Specific and Procedure-Specific RNP-AR approval in Part-SPA**
- **UK CAA has taken a pragmatic approach developing a single approval process whereby the operator is assessed for both types of RNP AR approach procedure**
- **Integrated with the operator destination approval process**
- **Operator's Safety Management System (SMS) manages the threat level and risk and required safety mitigation e.g. crew training or procedures, irrespective of whether a generic-specific or procedure-specific approach**

Approval of airspace designs

- Support to airports through FAS Facilitation Funding of SIDs/STARs and Approaches
- IFP design capability
 - ❑ Fly-ability of procedures – procedures breaking under strong wind conditions or else unintended consequences in terms of tracks over the ground, resulting in a high level of post implementation re-design
 - ❑ Lessons learned - include operators and coding houses as integral stakeholders
- Regulatory capacity
 - ❑ CAA resources stretched – policy, new regulatory processes (out-sourcing) and sheer quantity of work
- Environmental consultation and public campaigns against aviation noise
 - ❑ Legal action against the CAA decisions
 - ❑ New airspace design process intends to make things more transparent, but the risk is that it will only invite more opposition and the whole process will become too costly, time consuming and grind to a halt
 - ❑ Noise respite and/or mitigation has to be part of the airspace design solution

- Lack of AMC and Guidance material in relation to (Commission Regulation (EU) No. 2014/716) PCP AF#1.2 makes it difficult to plan and regulate
 - ❑ Is deployment of one SID/STAR from each runway end sufficient or is it left to the airports to decide how many they need or is it all arrival and departure routes?
 - ❑ No indication of what good compliance looks like
 - ❑ CAA view: deployment of the advanced features of PBN as described will be done on a business case assessment by each airport, it is the CAA's expectation that airports will deploy at least one example in the timeframe defined to deliver airport and terminal airspace operational benefits
 - ❑ Therefore, RNP 1 used only when supporting RF deployment i.e., where there is an operational requirement
 - ❑ Otherwise RNAV 1 is sufficient

PCP Regulatory Challenges

- When implementing the PCP, airspace change has to be considered across the TMA and cannot be limited to just the PCP airports
 - ❑ Airport interactions are a major consideration
 - ❑ Transition Altitude change a possible consequence
 - ❑ The only option is to consider a major airspace re-design i.e., FASI North and South

- Challenge to CAA of providing effective safety oversight whilst at the same time, facilitating change / modernisation through FAS
 - ❑ Transparency is key
 - ❑ Ensure the regulatory and facilitation roles are kept separate

Summary

- UK already well advanced with developing a framework for implementing SESAR
- FAS provides a UK strategy, a plan and funding opportunities
- Implementation of PBN to-date has been patchy
- Learned a great deal, but resources and Airspace Change backlog is an issue
- Airspace change is becoming more difficult and more challenging due to environmental opposition, institutional and political factors
- At a Commission and EASA level:
 - ❑ Lack of AMC and Guidance material in relation to PCP
 - ❑ A working assumption that the PCP will follow PBN-IR requirement
 - ❑ Lack of EASA airworthiness criteria
 - ❑ Issues with implementing current Air-OPS and FCL changes linked to PBN
- 01 January 2024 is just over 6 years away
 - ❑ Plans for London (and Manchester) TMAs therefore need to be in place soon
 - ❑ Time is running out



Thank you